

CLAIMS

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64. A conjugate for transferring a nucleic acid molecule into a cell, characterized in that it comprises a nucleic acid molecule, a translocation domain and an antibody specific for a surface antigen of said cell, such that said nucleic acid molecule, said translocation domain and said antibody are conjugated by means of at least one bridging agent, and such that said conjugate is transfected effectively into said cell.
65. The conjugate as claimed in claim 64, characterized in that it also comprises a peptide which can be cleaved with at least one glycolytic and/or proteolytic enzyme, said antibody being attached to said translocation domain via said cleavable peptide.
66. The conjugate as claimed in claim 65, characterized in that said antibody and said cleavable peptide are attached covalently via a bridging agent preferably selected from the group composed of benzoquinone, EDC and APDP.
67. The conjugate as claimed in claim 65, characterized in that said antibody and said cleavable peptide are attached to a molecule of the avidin type by means of a bridging agent, which may be identical or different, and which is preferably selected from the group composed of biotin, benzoquinone, EDC and APDP.

68. The conjugate as claimed in claim 66, characterized in that said translocation domain is attached to said cleavable peptide via a covalent chemical bond.
69. The conjugate as claimed in claim 68, characterized in that said translocation domain is attached to a nucleic acid molecule by means of a bridging agent.
70. The conjugate as claimed in claim 69, characterized in that said bridging agent is APDP.
71. The conjugate as claimed in claim 69, characterized in that said antibody is attached to said cleavable peptide via a covalent bond by means of said bridging agent EDC, said cleavable peptide being attached to said translocation domain via a covalent bond by means of chemical attachment, said translocation domain being attached to said nucleic acid via a covalent bond by means of said bridging agent APDP.
72. The conjugate as claimed in claim 68, characterized in that the attachment between said translocation domain and said nucleic acid molecule is produced by means of a nucleic acid-binding molecule, said nucleic acid-binding molecule being attached to said translocation domain via a covalent bond by means of a bridging agent.
73. The conjugate as claimed in claim 72, characterized in that said bridging agent is APDP.

74. The conjugate as claimed in claim 72, characterized in that said antibody is attached to said cleavable peptide via a covalent bond by means of said bridging agent EDC, said cleavable peptide being attached to said translocation domain via a covalent bond by means of chemical attachment, said translocation domain being attached to said nucleic acid-binding molecule via a covalent bond by means of said bridging agent APDP, said nucleic acid-binding molecule binding said nucleic acid via noncovalent attachment.
75. The conjugate as claimed in claim 64, characterized in that it also comprises a nucleic acid-binding molecule, such that said translocation domain, said antibody and said nucleic acid-binding molecule are attached to a molecule of the avidin type by means of a bridging agent, which may be identical or different, said nucleic acid-binding molecule binding said nucleic acid molecule.
76. The conjugate as claimed in claim 64, characterized in that it also comprises a nucleic acid-binding molecule and a peptide which can be cleaved with at least one glycolytic and/or proteolytic enzyme, such that said translocation domain, said antibody and said cleavable peptide are attached to a molecule of the avidin type by means of a bridging agent, which may be identical or different, said nucleic acid-binding molecule being bound to said nucleic acid molecule, said nucleic acid-binding molecule being attached to said cleavable peptide and bound to said nucleic acid molecule.

77. A conjugate for transferring a nucleic acid molecule into a cell, characterized in that it comprises a nucleic acid molecule, an antibody specific for a cell surface antigen and a nucleic acid-binding molecule, such that said conjugate is transfected effectively into said cell.
78. The conjugate as claimed in claim 77, characterized in that it also comprises a peptide which can be cleaved with at least one glycolytic and/or proteolytic enzyme, said antibody being attached to said nucleic acid-binding molecule via said cleavable peptide.
79. The conjugate as claimed in claim 78, characterized in that said antibody and said cleavable peptide are attached covalently via a bridging agent preferably selected from the group composed of benzoquinone, EDC and APDP.
80. The conjugate as claimed in claim 78, characterized in that said antibody and said cleavable peptide are attached to a molecule of the avidin type by means of a bridging agent, which may be identical or different, preferably selected from the group composed of biotin, benzoquinone, EDC and APDP.
81. The conjugate as claimed in claim 79, characterized in that said cleavable peptide is attached to said nucleic acid-binding molecule by means of a bridging agent, said nucleic acid-binding molecule binding said nucleic acid via noncovalent attachment.

82. The conjugate as claimed in claim 81, characterized in that said bridging agent is APDP.

~~83.~~ A conjugate for transferring a nucleic acid molecule into a cell, characterized in that it comprises a nucleic acid molecule, an antibody specific for a cell surface antigen and a peptide which can be cleaved with at least one glycolytic and/or proteolytic enzyme, such that said conjugate is transfected effectively into said cell.

A 84. The conjugate as claimed in claim 83, characterized in that said antibody and said cleavable peptide are attached covalently via a bridging agent preferably selected from the group composed of benzoquinone, EDC and APDP.

85. The conjugate as claimed in claim 83, characterized in that said antibody and said cleavable peptide are attached to a molecule of the avidin type by means of a bridging agent, which may be identical or different, preferably selected from the group composed of biotin, benzoquinone, EDC and APDP.

86. The conjugate as claimed in claim 84, characterized in that said cleavable peptide is attached to said nucleic acid via a covalent bond by means of a bridging agent.

87. The conjugate as claimed in claim 84, characterized in that the attachment between said cleavable peptide and said nucleic acid molecule is produced by means of a nucleic acid-binding molecule, said nucleic acid-binding molecule being attached to said cleavable peptide via a covalent bond by means of a bridging agent.
88. The conjugate as claimed in claim 86, characterized in that said bridging agent is APDP.
89. The conjugate as claimed in claim 83, characterized in that said conjugate also comprises a translocation domain.
90. The conjugate as claimed in claim 89, characterized in that said translocation domain is attached covalently, by means of a bridging agent, to said nucleic acid molecule and/or to said nucleic acid-binding molecule.
91. The conjugate as claimed in claim 64, characterized in that said bridging agent is selected from the group composed of benzoquinone, biotin, carbodiimides and bridging agents having at least one phenylazide group which reacts to ultraviolet (UV) radiation.
92. The conjugate as claimed in claim 64, characterized in that said bridging agent is selected from the group composed of benzoquinone, biotin, EDC and APDP.

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93. The conjugate as claimed in claim 75, characterized in that the bridging agent which attaches said translocation domain and said antibody to the molecule of the avidin type is biotin and the bridging agent which attaches said nucleic acid-binding molecule to the molecule of the avidin type is benzoquinone.
94. The conjugate as claimed in claim 76, characterized in that the bridging agent which attaches said translocation domain and said antibody to the molecule of the avidin type is biotin and the bridging agent which attaches said cleavable peptide to the molecule of the avidin type is benzoquinone.
95. The conjugate as claimed in claim 75, characterized in that the bridging agent which attaches said translocation domain, said antibody and said nucleic acid-binding molecule is biotin.
96. The conjugate as claimed in claim 76, characterized in that the bridging agent which attaches said translocation domain, said antibody and said cleavable peptide is biotin.
97. The conjugate as claimed in claim 80, characterized in that the bridging agent which attaches said antibody to the molecule of the avidin type is biotin and the bridging agent which attaches said nucleic acid-binding molecule to the molecule of the avidin type is benzoquinone.

98. The conjugate as claimed in claim 80, characterized in that said bridging agent is biotin.
99. The conjugate as claimed in claim 64, characterized in that said nucleic acid molecule is chosen from single-stranded DNA, double-stranded DNA, single-stranded RNA, double-stranded RNA and an RNA/DNA hybrid.
100. The conjugate as claimed in claim 99, characterized in that said nucleic acid molecule is double-stranded DNA or single-stranded RNA which encodes a protein product of interest which is expressed effectively in said cell.
101. The conjugate as claimed in claim 98, characterized in that said protein product of interest is chosen from a group composed of cytokines, lymphokines, chemokines, growth factors, killer genes, genes which make it possible to lift chemoresistance and restriction enzymes.
102. The conjugate as claimed in claim 101, characterized in that the protein product of interest is the Bax protein.
103. The conjugate as claimed in claim 99, characterized in that said nucleic acid molecule is an antisense RNA.
104. The conjugate as claimed in claim 71, characterized in that the nucleic acid binding molecule binds said nucleic acid molecule via noncovalent attachment.

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105. The conjugate as claimed in claim 71, characterized in that the nucleic acid-binding molecule is a polycationic polymer or a nucleic acid-binding protein.
 106. The conjugate as claimed in claim 105, characterized in that said polycationic polymer is chosen from poly-L-lysine, poly-D-lysine, polyethylenimine, polyamidoamine, polyamine and free polycations.
 107. The conjugate as claimed in claim 106, characterized in that said polycationic polymer is poly-L-lysine.
 108. The conjugate as claimed in claim 105, characterized in that said nucleic acid-binding protein is chosen from histones, protamine, ornithine, putrescine, spermidine, spermine, transcription factors and homeobox proteins.
 109. The conjugate as claimed in claim 108, characterized in that said nucleic acid-binding protein is selected from the group composed of protamine and histones.
 110. The conjugate as claimed in claim 64, characterized in that said translocation domain derives from a viral toxin, but does not contain the part of the toxin which confers on it its toxic effect.
 111. The conjugate as claimed in claim 110, characterized in that said translocation domain is a fragment of *Haemophilus A* hemagglutinin.

112. The conjugate as claimed in claim 64, characterized in that said antibody is a monoclonal antibody or a polyclonal antibody.
113. The conjugate as claimed in claim 112, characterized in that said antibody is specific for a membrane-bound surface antigen.
114. The conjugate as claimed in claim 113, characterized in that said antigen is the G250 antigen.
115. The conjugate as claimed in claim 113, characterized in that said antibody is the 5C5 monoclonal antibody obtained with the 5C5 hybridoma deposited at the CNCM under the No. I-2184.
116. The conjugate as claimed in claim 64, as a medicinal product.
117. The conjugate as claimed in claim 64, as a medicinal product for gene therapy.
118. The conjugate as claimed in claim 116, as a medicinal product for the treatment of acquired or constitutional genetic diseases.
119. The conjugate as claimed in claim 118, as a medicinal product for the treatment of acquired genetic diseases chosen from cancers and infectious diseases.

120. The conjugate as claimed in claim 119, as a medicinal product for the treatment of renal cell carcinoma (RCC).
121. The conjugate as claimed in claim 64, as a medicinal product intended to transfer a nucleic acid molecule into a cell, characterized in that said cell is brought into contact with said conjugate so as to transfect said cell with said conjugate.
122. The conjugate as claimed in claim 121, characterized in that said nucleic acid molecule encodes a protein product of interest which is expressed effectively in said transfected cell.
123. The conjugate as claimed in claim 121, characterized in that said nucleic acid molecule is maintained in the form of an extrachromosomal replicon in said cell.
124. The conjugate as claimed in claim 121, characterized in that said nucleic acid molecule integrates into the genomic and/or mitochondrial DNA of said transfected cell.
125. The conjugate as claimed in claim 121, characterized in that said cell is a eukaryotic cell.
126. A pharmaceutical composition, in particular for the treatment of diseases by gene therapy, which comprises a therapeutically effective amount of a conjugate as claimed in claim 64 and a pharmaceutically acceptable vehicle.